

Relate Rate Problems- HW Problems

1. Air is being pumped into a balloon at a rate of 30 cu.in/min. What is the rate of change of the radius when the radius is 4 in.? What is the rate of change of the surface area when the radius is 4 in.?
2. The edges of a cube are expanding at a rate of 2 in/sec. How fast is the surface area changing when each edge is 10 in.?
3. An airplane is flying horizontally at an altitude of 4mi. and a speed of 600 mph directly over a radar station. Find the rate of change of the distance between the plane and the radar station 5 minutes later.
4. At noon car A is 90 miles east of its destination travelling 60mph west. At the same time, car B is 90 miles north of that same destination travelling 50 mph south. How fast is the distance between the two cars changing at 1pm?
5. A spotlight on the ground shines on a wall 24 feet away. A man 6ft. tall is walking toward the spotlight at 4 ft/sec. How fast is the length of his shadow changing when he is 12 ft. from the wall?

6. A water tank has the shape of an inverted circular cone with the radius of the base 3 feet and the height 12 feet. If water is being pumped in at 4 cu. ft/min, find the rate at which the water level is rising when the volume of the water in the tank is $\frac{4\pi}{3}$ cu. ft.
7. A baseball diamond is a square with each side 90 ft. A player is running from first to second base at a rate of 24 ft/sec. At what rate is the player's distance to third base changing when the player is 30 ft. from second base?
8. An airplane flies at 600 mph at an altitude of 6 miles toward a point directly over an observer. Find the rate of change of the observer's angle of elevation when the plane is 10 miles from the observer.